

Noise immunity estimation of diffraction stacking method on the example of a homogeneous model

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Abstract

© SGEM2018. Seismic sources location is one of the main tasks of seismology (determination of earthquake hypocenters) and this is the main task in microseismic monitoring of hydraulic fracturing. When choosing a method for microseismic monitoring, noise immunity is one of the main parameters, which should be considered in order to obtain reliable results. The article is referred to the location of a point seismic source by the Diffraction Stacking method applied to synthetic signals obtained using 2D numerical simulation of seismic waves propagation in an elastic medium. Simulation of seismic wave propagation was carried out using the finite difference scheme, which allows simulating the propagation of longitudinal and vertically polarized transverse waves. Noise immunity estimation was carried out by adding random noise to the synthetically simulated signals and then finding the maximum of the image function throughout the modelled area. The results obtained make it possible to characterize the Diffraction Stacking method as weakly stable to random noise, the amplitude of which is comparable with the amplitude of the useful signal. Nevertheless, in general this method of seismic sources location can be applied to process the data with relatively high signal-to-noise ratios.

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Keywords

Diffraction stacking method, Hydraulic fracturing, Microseismic monitoring

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